REMARKS

Applicants appreciate the thorough examination of the present application as evidenced by the Office Action of September 13, 2007 (the "Action"). Claims 1-32 were pending at the time of the Action, and Claims 21-32 are canceled due to a restriction requirement. Claim 33 is new. Support for new Claim 33 can be found, for example, in Applicants' Specification at paragraph 32.

Claim 8 has been amended to address the claim objections on page 2 of the Action.

Claims 1, 3, 4, 6-9, 14 and 18 stand rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 6,097,058 to Nakamura ("Nakamura"). Claims 2, 5, 10-13, 15-17 and 19-20 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamura in view of various secondary references.

Applicants respectfully submit that the cited references do not disclose or render obvious the recitations of the claims for at least the following reasons.

I. Claim 1

Independent Claim 1 recites a semiconductor device including:

> a semiconductor substrate;
> a first oxide layer on the semiconductor substrate, the first oxide layer comprising an element from the semiconductor substrate;
> a second oxide layer on the first oxide layer opposite the semiconductor substrate, the second oxide layer comprising a stoichiometric, single-phase complex oxide represented by the formula:
>
> $A_hB_jO_k$, or equivalently $(A_mO_n)_a(B_qO_r)_b$
>
> in which the elemental oxide components, (A_mO_n) and (B_qO_r) are combined so that h = j or, equivalently, ma = bq, and a, b, h, j, k, m, n, q and r are non-zero integers; and
> wherein:
> A is an element of the lanthanide rare earth elements of the periodic table or the trivalent elements from cerium to 7lutetium; and
> B is an element of the transition metal elements of groups IIIB, IVB or VB of the periodic table.

Accordingly, the stoicheometry of the oxide layer $A_hB_jO_k$, or equivalently

$(A_mO_n)_a(B_qO_r)_b$ is such that the elemental oxide components satisfy h = j or, equivalently, ma = bq, *i.e.*, the oxide layer includes equal amounts of A and B (*see also* Applicants' Specification, paragraph 61).

The Action takes the position that column 9, lines 5-7 of Nakamura discloses the claimed oxide layer. However, the cited portion of Nakamura proposes a mixed crystal ferroelectric layer, such as $La_2Ti_2O_7$, $Ce_2Ti_2O_7$, $Gd_2Ti_2O_7$, $Y_2Ti_2O_7$. Mixed crystals include another constituent that fits into and is distributed in the lattice of the host crystal. For example, in the mixed crystal $Sr_2Ta_2O_7$ proposed by Nakamura, an amount of Ta is replaced by Nb (*i.e.*, $Sr_2(Ta_{1-x}Nb_x)O_7$, where $0<x<1$). *See* Nakamura, Abstract and col. 10, lines 58-62. Therefore, the mixed crystals proposed in Nakamura do not include equal amounts of the elemental oxide components A and B as recited in independent Claim 1.

In contrast to the recitations of Claim 1, Nakamura proposes a complex formula describing the mixed ferroelectric crystal structure as follows (*see* col. 9, line 55 – col. 10, line 3):

> $(A1_{y1}\ A2_{y2}\ .\ .\ .\ An_{yn})_2\ (B1_{x1}\ B2_{x2}\ .\ .\ .\ Bm_{xm})_2\ O_7$, and
> wherein x1+x2+ . . . +xm=1, and
> wherein y1+y2+ . . . +yn=1, and
> wherein each of x1, x2, . . . xm, y1, y2, . . . yn has a value equal to or greater than 0, and equal to or less than 1, and
> wherein at least two of x1, x2, . . . xm, y1, y2, . . . yn have values greater than 0, and less than 1, and
> wherein each of A1, A2, . . . , An is an element selected so as to be different from one another from a group consisting of elements belong to IIa group, IIIa group, and lanthanum series, where IIIa group consists of Sc, Y, La, and Ac, and
> wherein each of B1, B2, . . . , Bn is an element selected so as to be different from one another from a group consisting of Ti, Nb, Ta, Zr, Hf, Y.

In addition, the object of Nakamura is to provide a ferroelectric layer having a low dielectric constant. *See, e.g.*, Abstract and col. 2, lines 28-31. In contrast, embodiments according to the current invention can provide high dielectric constant layers that may be used, for example, as high dielectric thin gate insulating layers in field effect transistors. *See, e.g.*, Applicants' Specification, paragraph 33. Accordingly, Applicants submit that the

properties and advantages of the oxide layers recited in Claim 1 are not appreciated by the low dielectric constant ferroelectric layers of Nakamura.

In summary, the ferroelectric mixed crystals of Nakamura do not satisfy the recitation that h=j or, equivalently, ma = bq as recited in Claim 1, *i.e.*, such that there are equal amounts of A and B in the formula $A_hB_jO_k$, or equivalently $(A_mO_n)_a(B_qO_r)_b$. The deficiencies of Nakamura are not remedied by the secondary references discussed on pages 4-7 of the Action. Accordingly, Applicants respectfully request the withdrawal of the rejections under 35 U.S.C. §§ 102/103 of Claim 1 and Claims 2-20 depending therefrom.

II. New Claim 33

Claim 33 depends from Claim 1 and is patentable at least per the patentability of Claim 1. In addition, Claim 33 is separately patentable for at least the following reasons.

Claim 33 recites that the second oxide layer is non-crystalline. Support for Claim 33 can be found, for example, in Applicants' Specification at paragraph 32. As discussed above, Nakamura proposes mixed crystalline ferroelectric layers.

For at least these reasons, Applicants submit that Claim 33 is separately patentable and respectfully requests an indication of same.

CONCLUSION

Accordingly, the cited references do not disclose or render obvious the recitations of the independent Claim. Applicants submit that the pending claims are in condition for allowance.

Respectfully submitted,

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